Supporting Information for

Preparation of Multifunctional Microchannel-Network Graphene Foams

S1. Detailed fabrication of GO and microchannel-network graphene foams (μCNGFs).

GO was prepared by oxidation of natural graphite powder (325 mesh, south graphite Co., Ltd, China) according to the modified Hummers' method. Briefly, graphite (3.0 g) was added to concentrated sulfuric acid (70 mL) under stirring at room temperature, then sodium nitrate (1.5 g) was added, and the mixture was cooled to 0 ℃. Under vigorous agitation, potassium permanganate (9.0 g) was added slowly to keep the temperature of the suspension lower than 20 ℃. Successively, the reaction system was transferred to a 35-40 ℃ water bath for about 30 min, forming a thick paste. Then, 140 mL of water was added, and the solution was stirred for another 15 min. An additional 500 mL of water was added followed by a slow addition of 20 mL of H_2O_2 (30 %), turning the color of the solution from brown to yellow. The mixture was filtered and washed with 1:10 HCl aqueous solution (250 mL) to remove metal ions followed by repeated washing with water and centrifugation to remove the acid. The resulting solid was dispersed in water by ultrasonication for

1 h to make a GO aqueous dispersion (0.5 wt %).

The alumina fiber blanket (AFB, has a density of about 200 kg•m^{-3}) was initially put in a homogeneous GO aqueous solution (6 mg•mL^{-1}) for 0.5 h to sufficiently absorb the GO suspension. The GO/AFB composite was then annealed in the nitrogen atmosphere at 500 ℃ for 2 h to reduce the GO into rGO attached to the AFB. The AFB was finally removed with 10 % hydrofluoric acid (weight percentage, bought from Beijing chemical reagent company), then repeated washing with deionized water to remove all the acid followed by lyophilization and give the pure μCNGFs.

S2. Electrical property of pure μCNGF.

The bulk electrical conductivity of μCNGF is 13.6 S m^{-1} that measured by the four-probe method.

S3. Cyclic voltammetry of the flexible supercapacitors.

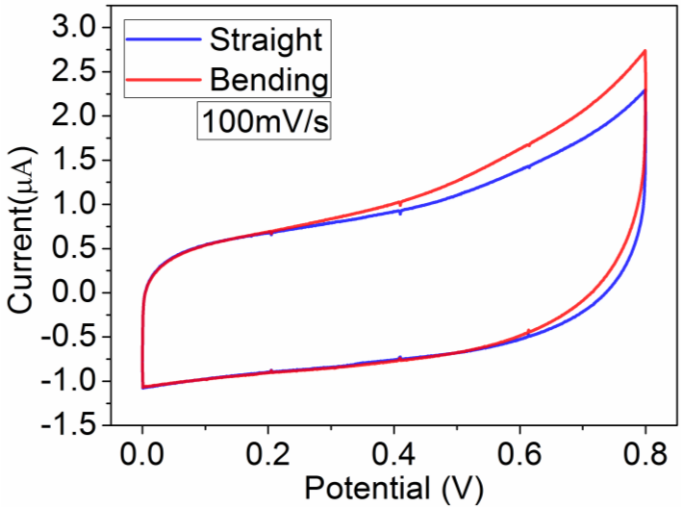

Fig. S1 Before and after bending, the cyclic voltammetry of the flexible supercapacitors, performance has improved a little.

S4. Specific surface area, and porosity analysis of μCNGF sample.

T-Plot External Surface Area= 12.76 m ²/g

Porosity (BJH method)= 0.0786 mL/g

S5. AFM image of rGO.

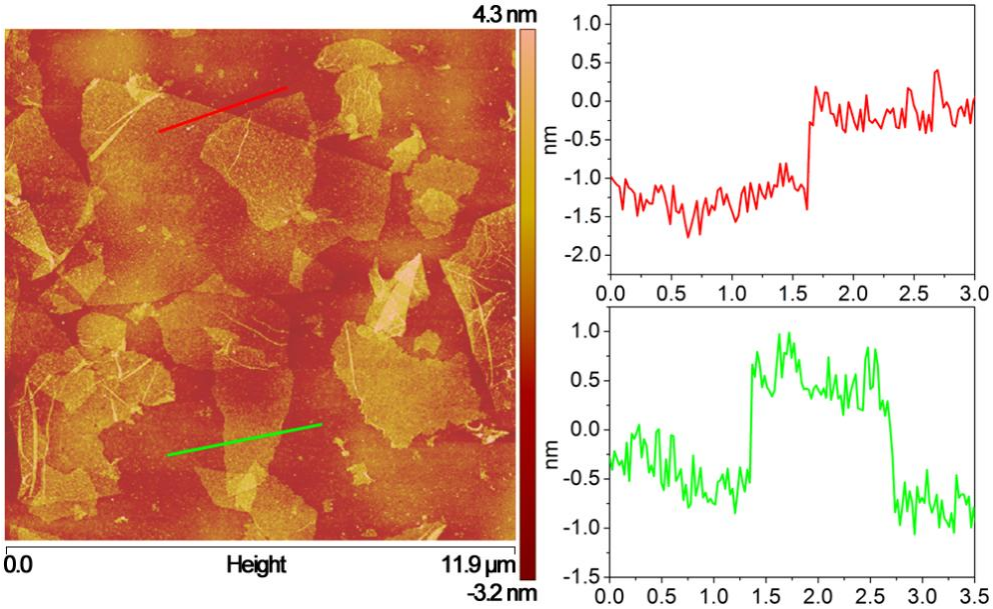

Fig. S2 AFM of rGO, most rGO are few-/single- layer films.

S6. Nitrogen adsorption-desorption isotherm of µCNGF sample.

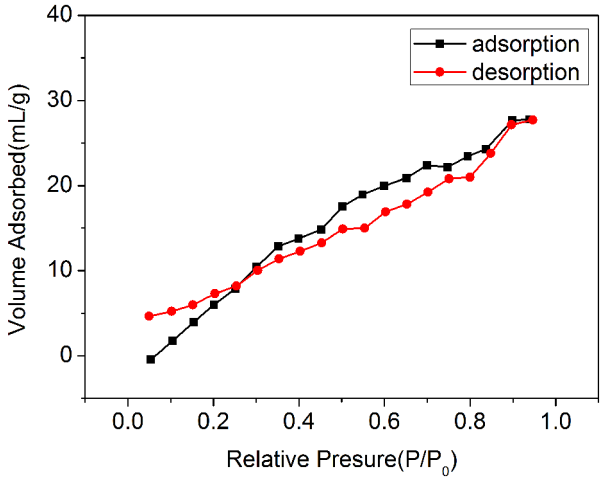

Fig. S3 Nitrogen adsorption-desorption isotherm of µCNGF.

S7. Pore size distribution curve of μCNGF sample.

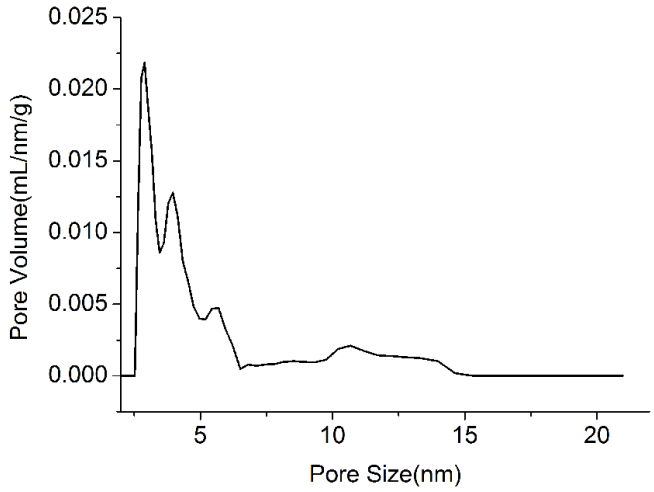

Fig. S4 Pore size distribution curve of μCNGF sample.

S8. Cyclic stability of μCNGF electrode.

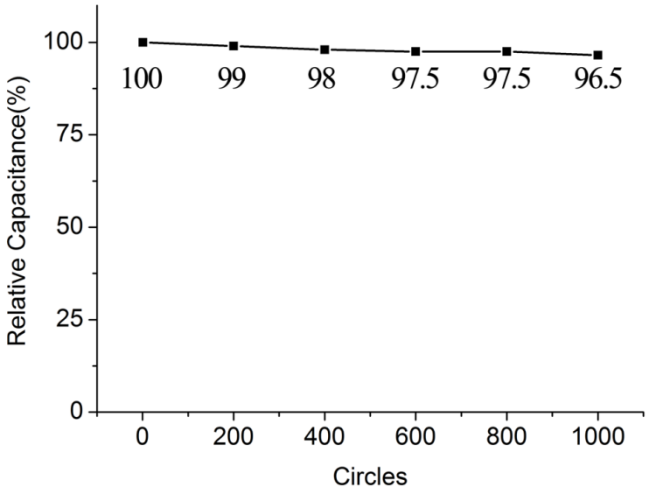

Fig. S5 Cyclic stability of μCNGF electrode (0, 200, 400, 600, 800, and 1000 circles).

S9. Specific capacitance at different areal densities and different scan rates of μCNGF electrode.

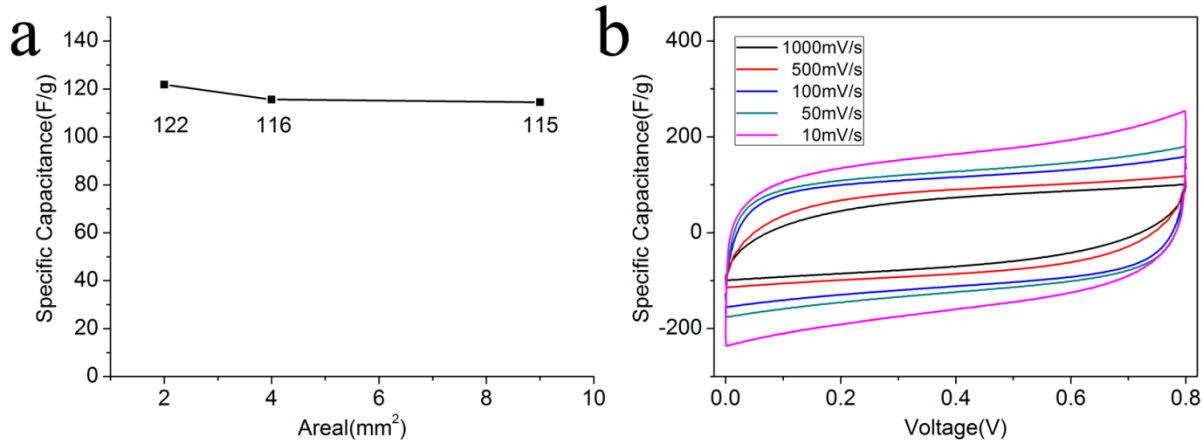

Fig. S6 Specific capacitance at different areal densities in the current density of 5 A/g (2, 4, and 9 mm^2) (a), the areal densities had little effect on the specific capacitance; specific capacitance at different scan rates (1000, 500, 100, 50, and 10 mV/s, respectivily) (b).

S10. Nyquist plots of μCNGF sample.

Figure S7 shows the Nyquist plot obtained in 1 M KOH at the frequency range from 100 kHz to 1 Hz. The near-vertical slope at the low frequency region indicates a good capacitor behavior of μCNGF. The equivalent series resistance obtained from the x-intercept of the Nyquist plot (Figure S7 inset, supporting information) is low at ~3.5 Ω, suggesting that the μCNGF electrodes have small resistance with good ion response.

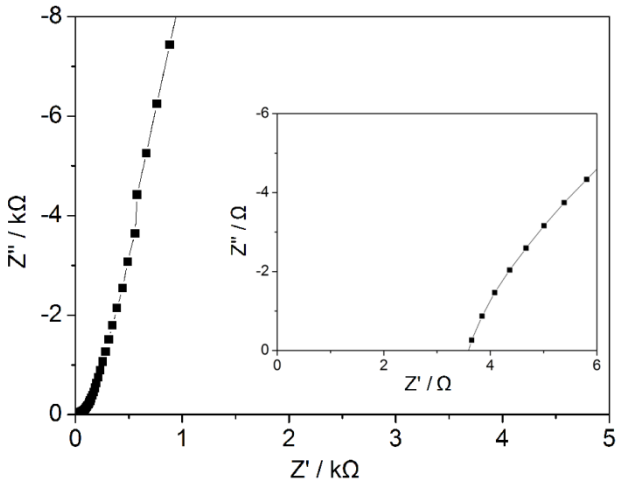

Fig. S7 Nyquist plots for supercapacitors based on μCNGF sample.

S11. EDS and XPS analysis of μCNGF sample.

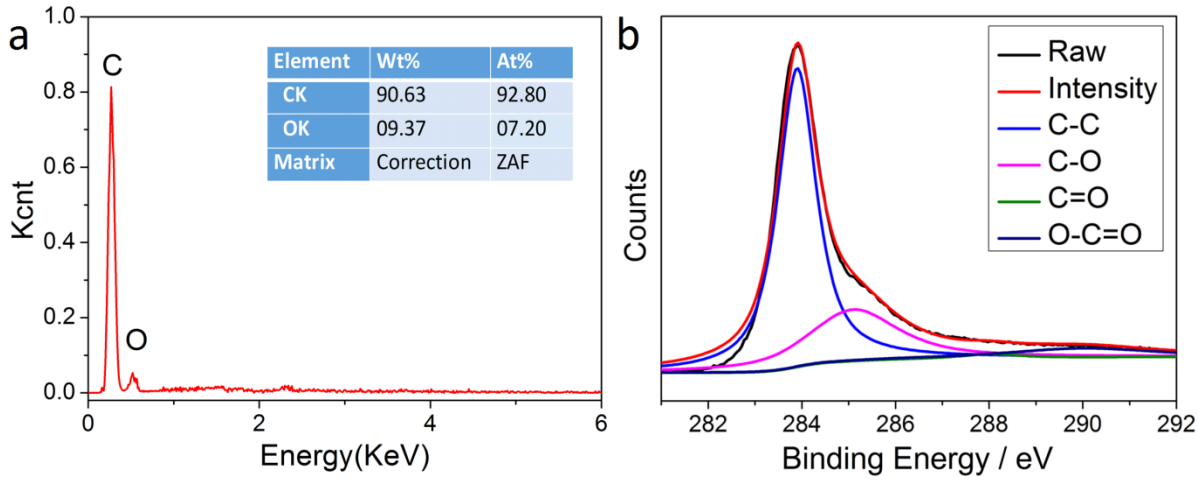

Fig. S8 EDS and XPS analysis of μCNGF sample.

The μCNGF sample contains only C and O atoms, and its chemical structure is also determined by XPS.